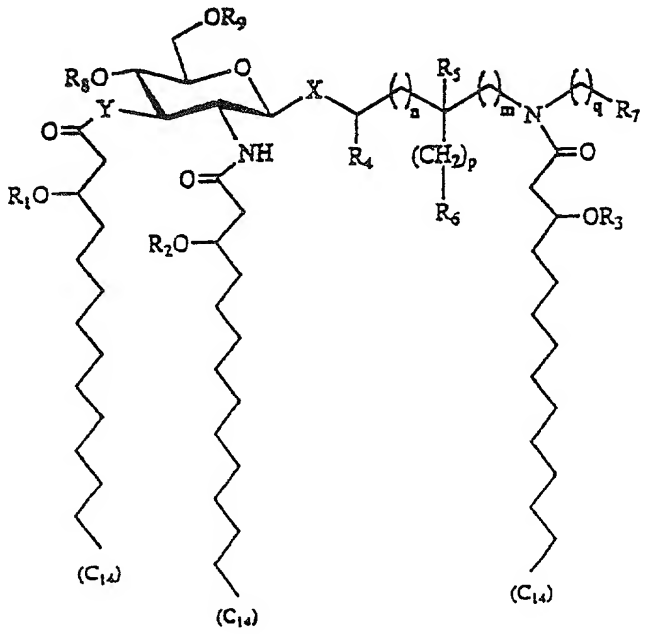
Claims

What is claimed is:

1. An immunoeffector compound having the following structure:



wherein, X is selected from the group consisting of O and S at the axial or equitorial position; Y is selected from the group consisting of O and NH; n, m, p and q are integers from 0 to 6; R_1, R_2 and R_3 are the same or different and are normal fatty acyl residues having from 1 to about 20 carbon atoms and where one of R_1, R_2 or R_3 is optionally hydrogen; R_4 and R_5 are the same or different and are selected from the group consisting of H and methyl; R_6 and R_7 are the same or different and are selected from the group consisting of H, hydroxy, alkoxy, phosphono, phosphonooxy, sulfo, sulfooxy, amino, mercapto, cyano, nitro, formyl and carboxy, and esters and amides thereof; and R_8 and R_9 are the same or different and are selected from the group consisting of phosphono and H, and at least one of R_8 and R_9 is phosphono.

2. The compound of claim 1, wherein R_6 is carboxy.

3. The compound of claim 2, wherein X is O; Y is O; n, m, p and q are 0; R_1, R_2 and R_3 are normal fatty acyl residues having 10 carbon atoms; R_4 , R_5 and R_7 are H; R_8 is phosphono; R_9 is H; R_1, R_2 and R_3 are each attached to a stereogenic center having an *R* configuration; and R_5 is attached to a stereogenic center having an *S* configuration.

4. The compound of claim 2, wherein X is O; Y is O; n, m, p and q are 0; R_1, R_2 and R_3 are normal fatty acyl residues having 12 carbon atoms; R_4, R_5 and R_7 are H; R_8 is phosphono; R_9 is H; R_1, R_2 and R_3 are each attached to a stereogenic center having an *R* configuration; and R_5 is attached to a stereogenic center having an *S* configuration.

5. The compound of claim 2, wherein X is O; Y is O; n, m, p and q are 0; R_1, R_2 and R_3 are normal fatty acyl residues having 10 carbon atoms; R_4, R_5 and R_7 are H; R_8 is phosphono; R_9 is H; R_1, R_2 and R_3 are each attached to a stereogenic center having an *R* configuration; and R_5 is attached to a stereogenic center having an *R* configuration.

6. The compound of claim 2, wherein X is O; Y is O; n, m, p and q are 0; R_1, R_2 and R_3 are normal fatty acyl residues having 8 carbon atoms; R_4, R_5 and R_7 are H; R_8 is phosphono; R_9 is H; R_1, R_2 and R_3 are each attached to a stereogenic center having an *R* configuration; and R_5 is attached to a stereogenic center having an *S* configuration.

7. The compound of claim 1, wherein R_6 is H.

8. The compound of claim 7, wherein X is O; Y is O; n is 2; m, p and q are 0; R_1, R_2 and R_3 are normal fatty acyl residues having 14 carbon atoms; R_4, R_5 and R_7 are H; R_8 is phosphono; R_9 is H; and R_1, R_2 and R_3 are each attached to a stereogenic center having an *R* configuration.

9. The compound of claim 7, wherein X is O; Y is O; n is 1, m and p are 0; q is 1; R_1, R_2 and R_3 are normal fatty acyl residues having 10 carbon atoms; R_4 and R_5 are H; R_7 is carboxy; R_8 is phosphono; R_9 is H; and R_1, R_2 and R_3 are each attached to a stereogenic center having an *R* configuration.

10. The compound of claim 7, wherein X is O; Y is O; m, n, p and q are 0; R_1, R_2 and R_3 are normal fatty acyl residues having 14 carbon atoms; R_4, R_5 and R_7 are H; R_8 is phosphono; R_9 is H; and R_1, R_2 and R_3 are each attached to a stereogenic center having an *R* configuration.

11. The compound of claim 7, wherein X is O; Y is O; m, n, p and q are 0; R_1, R_2 and R_3 are normal fatty acyl residues having 10 carbon atoms; R_4, R_5 and R_7 are H; R_8 is phosphono; R_9 is H; and R_1, R_2 and R_3 are each attached to a stereogenic center having an *R* configuration.

12. The compound of claim 7, wherein X is O; Y is O; m, p and q are 0; n is 1; R_1, R_2 and R_3 are normal fatty acyl residues having 14 carbons; R_4, R_5 and R_7 are H; R_8 is phosphono; R_9 is H; and R_1, R_2 and R_3 are each attached to a stereogenic center having an *R* configuration.

13. The compound of claim 1, wherein R_6 is hydroxy.

14. The compound of claim 13, wherein X is O; Y is O; m, n and q are 0; p is 1; R_1, R_2 and R_3 are normal fatty acyl residues having 12 carbon atoms; R_4 and R_5 are H; R_7 is H; R_8 is phosphono; and R_9 is H; R_1, R_2 and R_3 are each attached to a stereogenic center having an *R* configuration; and R_5 is attached to a stereogenic center having an *S* configuration.

15. The compound of claim 13, wherein X is O; Y is O; m and q are 0; n and p are 1; R_1, R_2 and R_3 are normal fatty acyl residues having 10 carbon atoms; R_4, R_5 and

R_7 are H; R_8 is phosphono; R_9 is H; R_1, R_2 and R_3 are each attached to a stereogenic center having an *R* configuration; and R_5 is attached to a stereogenic center having an *S* configuration.

16. The compound of claim 13, wherein X is O; Y is O; m, n and q are 0; p is 2; R_1, R_2 and R_3 are normal fatty acyl residues having 10 carbon atoms; R_4, R_5 and R_7 are H; R_8 is phosphono; R_9 is H; R_1, R_2 and R_3 are each attached to a stereogenic center having an *R* configuration; and R_5 is attached to a stereogenic center having an *S* configuration.

17. The compound of claim 13, wherein X is O; Y is O; m, n and q are 0; p is 1; R_1, R_2 and R_3 are normal fatty acyl residues having 14 carbon atoms; R_4, R_5 and R_7 are H; R_8 is phosphono; R_9 is H; R_1, R_2 and R_3 are each attached to a stereogenic center having an *R* configuration; and R_5 is attached to a stereogenic center having an *R* configuration.

18. The compound of claim 13, wherein X is O; Y is O; m, n and q are 0; p is 1; R_1, R_2 and R_3 are normal fatty acyl residues having 14 carbon atoms; R_4, R_5 and R_7 are H; R_8 is phosphono; R_9 is H; R_1, R_2 and R_3 are each attached to a stereogenic center having an *R* configuration; and R_5 is attached to a stereogenic center having an *S* configuration.

19. The compound of claim 13, wherein X is O; Y is O; m, n and q are 0; p is 1; R_1, R_2 and R_3 are normal fatty acyl residues having 11 carbon atoms; R_4, R_5 and R_7 are H; R_8 is phosphono; R_9 is H; R_1, R_2 and R_3 are each attached to a stereogenic center having an *R* configuration; and R_5 is attached to a stereogenic center having an *S* configuration.

20. The compound of claim 13, wherein X is O; Y is O; m, n and q are 0; p is 1; R_1, R_2 and R_3 are normal fatty acyl residues having 10 carbon atoms; R_4, R_5 and R_7 are H; R_8 is phosphono; R_9 is H; R_1, R_2 and R_3 are each attached to a stereogenic center having an *R* configuration; and R_5 is attached to a stereogenic center having an *S* configuration.

21. The compound of claim 1, wherein X is O; Y is O; m, n, p and q are 0; R_1, R_2 and R_3 are normal fatty acyl residues having 10 carbon atoms; R_4 and R_5 are H; R_6 is amino carbonyl; R_7 is H; R_8 is phosphono; and R_9 is H; R_1, R_2 and R_3 are each attached to a stereogenic center having an *R* configuration; and R_5 is attached to a stereogenic center having an *S* configuration.

22. The compound of claim 1, wherein R_1 is hydrogen.

23. The compound of claim 1, wherein R_2 is hydrogen.

24. The compound of claim 1, wherein R_3 is hydrogen.

25. A method for enhancing the immune response of a mammal comprising administering to the mammal an effective amount of a compound of claim 1.

26. An immunogenic composition comprising a compound of claim 1, an antigen and a suitable carrier.

27. A pharmaceutical composition comprising a compound of claim 1 and a pharmaceutically acceptable carrier.

28. The composition of claim 27, wherein said pharmaceutically acceptable carrier is an aqueous composition comprising water and one or more surfactants selected from the group consisting of glycodeoxycholate, deoxycholate, sphingomyelin, sphingosine, phosphatidylcholine, 1,2-Dimyristoyl-sn-glycero-3-phosphoethanolamine, L-α-Phosphatidylethanolamine, and 1,2-Dipalmitoyl-sn-glycero-3-phosphocholine, or a mixture thereof.

29. The composition of claim 28, wherein said one or more surfactant is 1,2-Dipalmitoyl-sn-glycero-3-phosphocholine.

30. The composition of claim 28, wherein the molar ratio of said compound to surfactant is from about 10:1 to about 1:25.

31. The composition of claim 28, wherein the molar ratio of said compound to surfactant is from about 4:1 to about 1:9.

32. The composition of claim 27, wherein said carrier is a stable emulsion comprising a metabolizable oil, one or more surfactants, an antioxidant and a component to make the emulsion isotonic.

33. The composition of claim 32, wherein said stable emulsion comprises 1-10% v/v squalene, 0.9% w/v PLURONIC-F68 block co-polymer, 1.9% w/v egg phosphatidyl choline, 1.75% v/v glycerol and 0.05% w/v α tocopherol.

34. The composition of claim 27 wherein said carrier is a suspension comprising aluminum hydroxide, calcium hydroxide, calcium phosphate or tyrosine adsorbate.

35. The composition of claim 27 wherein said carrier is an aqueous solution or aqueous micellar dispersion comprising triethylamine or triethanolamine.

36. The composition of claim 27 wherein said carrier comprises microspheres or microparticles, and the compound of claim 1 is within the matrix of the microspheres or microparticles or adsorbed thereon.

37. A composition comprising a compound of claim 1 and one or more polypeptide.

38. The composition of claim 37 wherein said compound is a 2-[(*R*)-3-Tetradecanoyloxytetradecanoylamino]ethyl 2-Deoxy-4-*O*-phosphono-3-*O*-[(*R*)-3-

tetradecanoyloxytetradecanoyl]-2-[(*R*)-3-tetradecanoyloxytetradecanoylamino]-β-D-glucopyranoside.

39. The composition of claim 38 wherein said polypeptide is the hepatitis B surface antigen.

40. A composition comprising a compound of claim 1 and one or more polynucleotide.

41. The composition of claim 40 wherein said polynucleotide encodes a polypeptide.

42. The composition of claim 38 wherein said compound is a 2-[(*R*)-3-Tetradecanoyloxytetradecanoylamino]ethyl 2-Deoxy-4-*O*-phosphono-3-*O*-[(*R*)-3-tetradecanoyloxytetradecanoyl]-2-[(*R*)-3-tetradecanoyloxytetradecanoylamino]-β-D-glucopyranoside.

43. A method for illiciting an immune response in a mammal, comprising the step of administering a composition of claim 37.

44. The method of claim 43 wherein said immune response is immunoprotective.

45. The method of claim 43 wherein said mammal is a human.

46. A method for illiciting an immune response in a mammal, comprising the step of administering a composition of claim 40.

47. The method of claim 46 wherein said immune response is immunoprotective.

48. The method of claim 46 wherein said mammal is a human.